

NASA TECH BRIEF

Langley Research Center



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Office, NASA, Code KT, Washington, D.C. 20546.

Measuring Micro-Organism Gas Production

A simple method has been devised to measure micro-organism gas production. It uses a pressure transducer to sense pressure buildup. The transducer is easy to assemble and use, and the rate of gas produced can be measured automatically and accurately.

This method can be used in research and in clinical laboratories, and for environmental pollution studies, because of its ability to detect and quantify rapidly the number of gas-producing micro-organisms in water, beverages, and clinical samples.

A 5.0-psi (35×10^3 -N/m²) differential pressure transducer and a 20-gauge needle are fitted to a metal cap which is machined to fit a 20- by 150-mm test tube. The inlet tube of the transducer and the needle are inserted through the cap and soldered into place. A silicone rubber gasket is positioned inside the cap to form a gastight seal. The needle, with an on-off valve attached, is used to equalize pressure inside the test tube with ambient pressure after the cap is positioned in place.

The culture tube and transducer assembly are placed inside an incubator, with the electrical output of the transducer connected to a strip chart recorder. A dc power supply is used to energize the transducer. Measurements on the recorder are made on the 50-mV scale, and, in addition, an ac-dc digital voltmeter is used to read millivolt responses directly. The linear relationships between inoculum size and time-to-pressure buildup permit quantification of the number of micro-organisms in a sample.

The pressure transducer technique can be used effectively to determine the number of coliforms, in one sample of water, more accurately and faster than the presently used MPN (Most Probable Number) procedure.

Gas-producing micro-organisms of the Enterobacteriaceae are responsible for the majority of urinary tract infections. As counts must exceed 100,000 cells/ml before a urinary infection is established, it is possible to determine within five hours or less, with the transducer method, the number of micro-organisms in a sample. The conventional plate-counting method requires 24 hours.

This technique has potential application in the alcoholic beverage industry (beer, wine, whiskey, etc.), where the transducer method could be used to check on the fermentation capabilities of yeast cultures and also as an aid in monitoring various stages of production.

Note:

Requests for further information may be directed to:
Technology Utilization Officer
Langley Research Center
Mail Stop 139-A
Hampton, Virginia 23665
Reference: B73-10241

Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

Patent Counsel
Langley Research Center
Code 456
Hampton, Virginia 23665

Source: Judd R. Wilkins, Albin O. Pearson,
and Stacey M. Mills
Langley Research Center
(LAR-11326)